PATENT
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What is claimed is:

1. A method of producing a fiber from a cylindrical preform, comprising the steps of:

providing a first end of a cylindrical preform in a pressure chamber wherein the preform has a first lateral dimension along a longitudinal axis;

exposing the first end of the preform to a treatment that allows for ductility of the preform at its first end; and

applying physical pressure by flowing a focusing fluid along a portion of the preform, wherein the focusing fluid is caused to flow in a direction along the preform and toward the first end of the preform thereby forcing the first end of the ductile preform through an exit opening of the pressure chamber positioned downstream of the flow of the focused fluid thereby expelling a fiber from the exit opening of the pressure chamber wherein the fiber has a decreased lateral dimension relative to the first lateral dimension of the preform.

2. The method of claim 1, wherein the treatment that allows for ductility comprises heating the preform.

3. The method of claim 2, wherein the preform is solid prior to heating and is heated to provide ductibility prior to applying physical pressure.

4. The method of claim 2, wherein the preform is heated by heating the focusing fluid.

5. The method of claim 1, wherein the preform is comprised of silica glass.

6. The method of claim 1, wherein the preform is an optical fiber preform comprised of silica.

7. The method of claim 1, wherein the cylindrical preform is a solid cylinder comprising silica glass and is expelled from the exit opening as a solid cylindrical fiber.

8. The method of claim 1, wherein the cylindrical preform is a hollow cylinder comprising silica glass and is expelled from the exit opening as a hollow cylindrical fiber.

9. The method of claim 6, wherein the focusing fluid is a gas.

10. The method of claim 9, wherein the gas is heated inert gas.

11. The method of claim 9, wherein the gas exits the exit opening of the pressure chamber at supersonic speed.

12. The method of claim 1, wherein the ductile preform is drawn through a nozzle which nozzle begins as an opening inside the pressure chamber and extends along a curved surface, ending at the exit opening of the pressure chamber.

13. The method of claim 12, wherein the curved surface of the nozzle has a surface configuration with a nozzle parameter geometry defined by an equation

$$p(x) = p_0 e^{-\lambda x}$$

where $p(x)$ is a curve defining function which plots the nozzle geometry, p_0 is the internal pressure of the focusing fluid as it enters the nozzle, λ is greater than 0.635 to obtain supersonic speed for the focusing fluid and x is a function.

14. The method of claim 13 where λ is 2.0 or more.

15. The method of claim 13 where λ is about 5.65.

16. The method of claim 12, wherein the equation

$$P_0 \geq \frac{\mu_\ell V_1}{L}$$

applies and P_0 is the pressure at an entrance port to the pressure chamber; μ is the viscosity of the ductile preform end, V_1 is the velocity of the fiber in the nozzle and L is the length of the nozzle.

17. A method of producing a fiber from a molten viscous liquid; comprising the steps of:

extruding a stream of a molten viscous liquid in a manner so as to flow from a supply source into a pressure chamber wherein the stream has a first circumference;

supplying a focusing fluid to the pressure chamber whereby the fluid enters through an entrance port of the pressure chamber and exits through an exit port of the pressure chamber positioned downstream of the flow of the stream of molten viscous liquid;

wherein the focusing fluid surrounds the stream of molten viscous fluid and compresses the first circumference creating a narrowed stream of a second circumference narrower than the first circumference, which narrowed stream is expelled from the exit port of the pressure chamber as a fiber.

18. The method of claim 17, wherein the molten viscous liquid is molten silica glass.

19. The method of claim 18, wherein the focusing fluid is a gas.

20. The method of claim 19, wherein the gas is a heated inert gas.

21. The method of claim 18, wherein the gas exits the exit opening of the pressure chamber at supersonic speed.

22. The method of claim 21, wherein the stream of molten silica glass flows through a nozzle which nozzles begin as an opening inside the pressure chamber and extends along a curved surface ending at the exit port of the pressure chamber.

23. The method of claim 22, wherein the curved surface of the nozzle has a surface configuration with a nozzle parameter geometry defined by an equation

$$p(x) = p_0 e^{-\lambda x}$$

where p(x) is a curve defining function which plots the nozzle geometry, p_0 is the internal pressure of the focusing fluid as it enters the nozzle, λ is greater than 0.635 to obtain supersonic speed for the focusing fluid and x is a function.

24. The method of claim 23 where λ is 2.0 or more.

25. The method of claim 23 where λ is about 5.65.

26. The method of claim 23, wherein the equation

$$P_0 \geq \frac{\mu_\ell V_1}{L}$$

applies and P_0 is the pressure at an entrance port to the pressure chamber; μ is the viscosity of the ductile preform end, V_1 is the velocity of the fiber in the nozzle and L is the length of the nozzle.

27. A method of producing an optical fiber preform element, comprising the steps of:

providing a hollow tube having a longitudinal axis;

applying physical pressure to force the tube through a feeding source in a manner which causes the preform to be expelled from an exit opening of the channel in a longitudinal manner; and

forcing a fluid through a pressure chamber in a manner which causes the fluid to exit the pressure chamber from an exit orifice in front of a flow path of the preform expelled from the exit opening of the channel,

wherein the fluid surrounds said preform and focuses said preform in a longitudinal manner to expel an optical fiber from said pressure chamber.

28. A device for producing a fiber, comprising:

a pressure chamber comprising an entrance port for adding a focusing fluid and an exit port for expelling a viscous liquid; and

a nozzle positioned in the exit port, the nozzle comprising a curved surface with a geometry defined by an equation

$$p(x) = p_0 e^{-\lambda x}$$

where $p(x)$ is a curve defining function which plots the nozzle geometry, p_0 is the internal pressure of the focusing fluid as it enters the nozzle, λ is greater than 0.635 to obtain supersonic speed for the focusing fluid and x is a function.